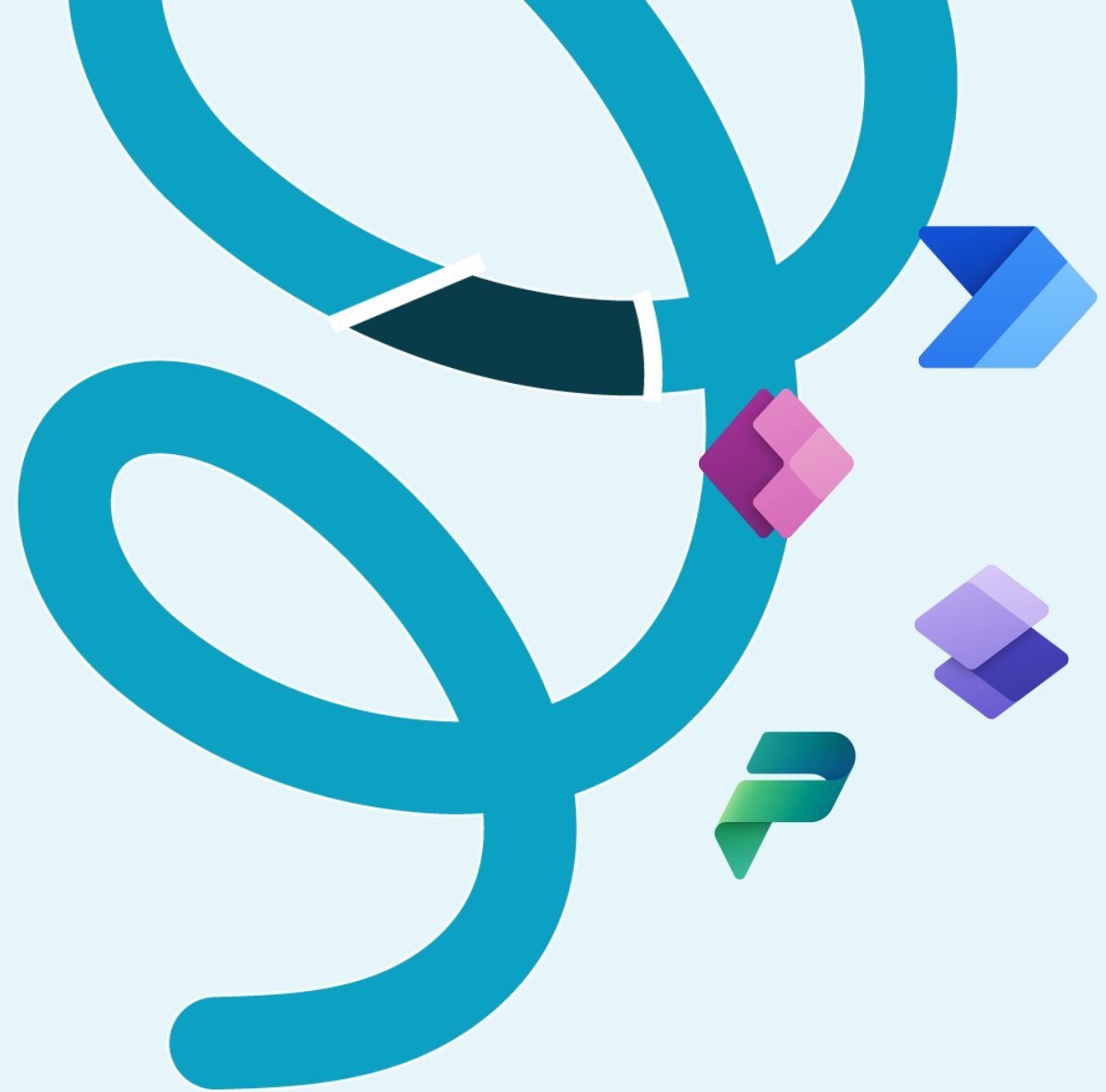




Wat kan ik wel of niet met Virtual Tables?

Nathalie Leenders



CollabDaysNL Sponsors





Nathalie Leenders

Wie ben ik?

- Power Platform Consultant
- Microsoft MVP Business Applications
- MCT application ongoing 🙏
- 12x Microsoft certified
- Has a purrrsonal assistant called Floof
- Married, got a bonus daughter
- Loves to travel and share knowledge
- Expect memes and Muppets





Agenda

Storytime

What are Virtual Tables?

Functionality

Different Native Data sources

Leveraging the Power Platform

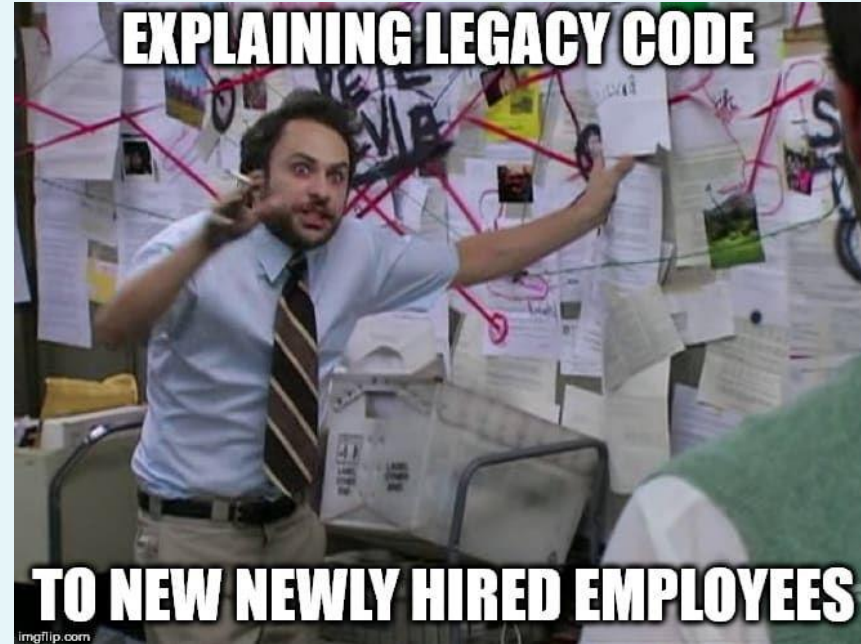
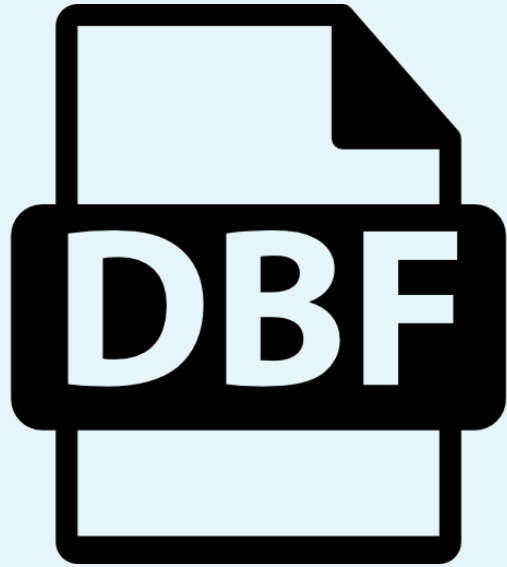
Reporting

Known Limitations

Recap

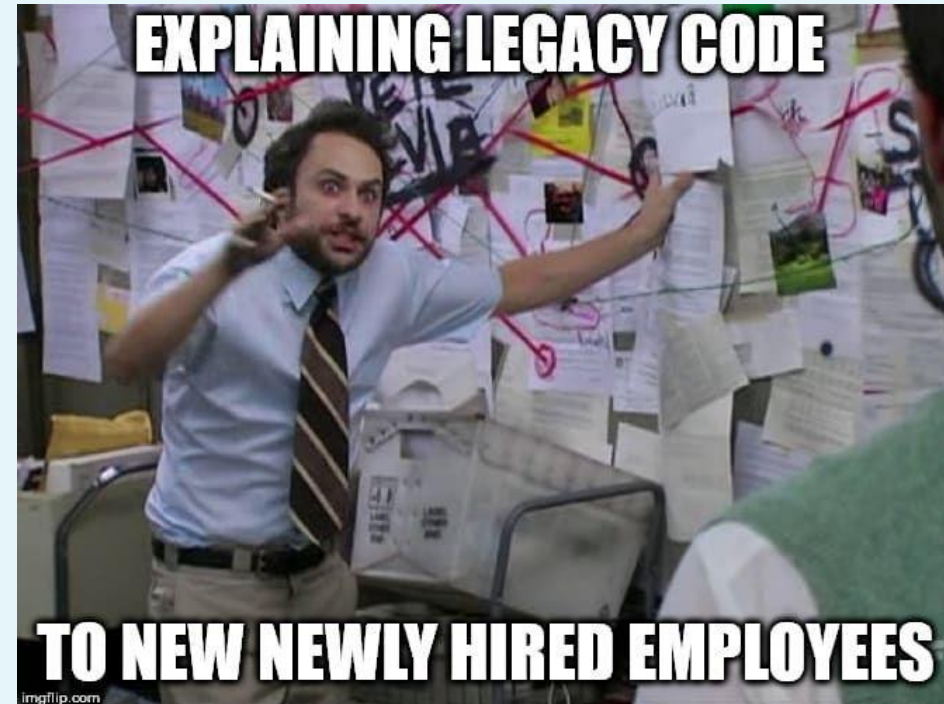
Storytime

Replacing a legacy app – The data



The application we wanted to replace, had a DBF data backend
250+ tables, no known schema or relationships, no documentation

Replacing a legacy app – The export



Only software to read the data I could get, was the DBF View with export to csv option
Manually exported, hand picked over 50 tables to CSV (it was either that or learn Python)

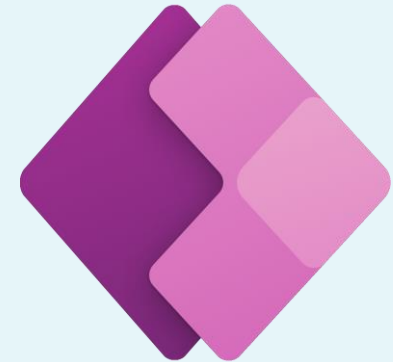
Replacing a legacy app – The solution



+



=



SQL Database

Pipeline loaded in all the data into tables

Dataverse

Connected to SQL using Virtual Tables

PowerApps

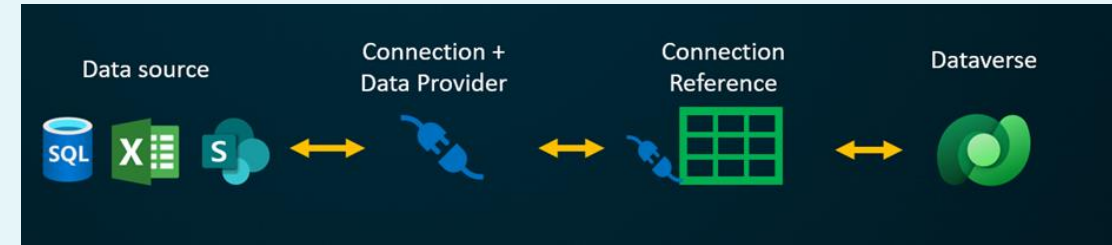
Connected with Virtual Tables

What are Virtual tables?

And why should I use them?



What are they?



- Your Virtual Table reads your data from your data source and is able to display it in Dataverse.
- Virtual connectors and tables in Dataverse
- **Re-use data**, without needing to migrate
 - Use them through Dataverse in your app, Power Pages or others.
- Through this connection you can automate without excessive costs for migrations.
- **Full CRUD** (Create, Read, Update, Delete) to your data source.

Table ▾	Name ▾	Type ▾	Managed ▾	Customizable ▾	Tags ▾
Entity Catalog for SQL	msdyn_ec_	Virtual	No	Yes	Custom
Werkr	cr3ae_werkr	Virtual	No	Yes	Custom
Custom Entity [dbo].[Werkr]	cr3ae_dbo_werkr	Virtual	No	Yes	Custom

Considerations



Architecture

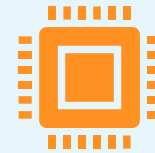
Model driven apps and **Power Pages** can only use Dataverse as a data source.

Can we add new components to the apps that are compatible?



Auditing

Auditing can only take place on the source, **not** on the Virtual Table itself, does this fit the requirements?



Data Migration

Does the client have budget and desire to move the data?

You can **reuse** data.

Prevent high costs.

Premium license needed.

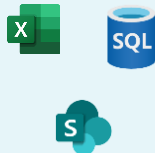
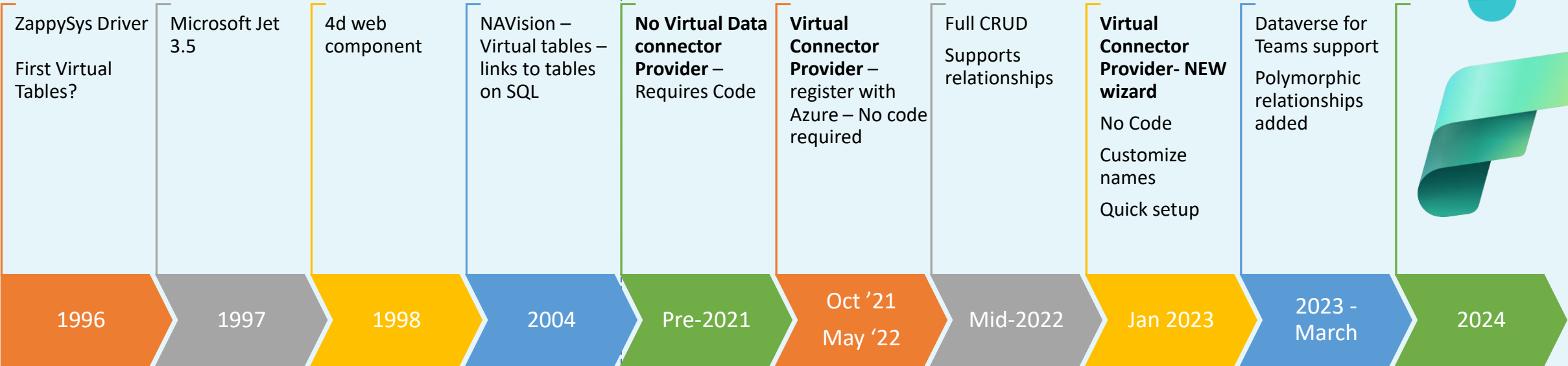


Functionality

Does the solution fit within the constraints of Virtual Tables?

Is your source SQL and do you want dropdown menus?

Timeline



Functionality



Virtual Table Providers

	Virtual Connector Providers	OData Data Providers	Custom Data Providers
Code required	No Code	Pro	Pro
Data sources supported	Excel, SharePoint, SQL	OData web services; such as D365 or Azure	Custom plugins to call APIs
Easy to setup/Supportability	Easy	Medium	Difficult

What can it do?

- Connect to your data source that's not natively on Dataverse
- Full CRUD operations for custom virtual tables (if the source let's you)
- Relationships setup on native and virtual tables
- Multi-Table (Polymorphic) Lookups supporting virtual tables

Meaning, you can create lookup tables from and to your virtual table.

Update Data Provider

Data Provider Name: SQLSERVER

Solution: MainSolution

Data Source Entity: adc_ Accommodation /

Assembly: (Assembly) Xrm.Plugins

Main Operation Event Handlers

Retrieve	(Plugin) Xrm.Plugins.RetrievePlugin
RetrieveMultiple	(Plugin) Xrm.Plugins.RetrieveMultiplePlug
Create	(Plugin) Xrm.Plugins.CreatePlugin
Update	(Plugin) Xrm.Plugins.UpdatePlugin
Delete	(Plugin) Xrm.Plugins.DeletePlugin

NOTE: All entities using this data provider are read-only.

Update Cancel

More on Plug-ins later

Installing Virtual Connectors in Dataverse

1. Make sure you have Premium
(without it, you won't be able to use Dataverse or virtual tables)
2. Go to AppSource
3. Search for Virtual Connectors in Dataverse
4. Install in your desired environment
5. You're now ready to use virtual tables.



Virtual connectors in Dataverse


Microsoft Dynamics 365

 Power Apps

☆☆☆☆☆ (0 Ratings) [Write a review](#)

Pricing **Free**

[Get it now](#)

 [Save to my list](#)



Classic way to connect Virtual Entity Catalogue

1. Create an entity catalog through the admin center (classic D365 experience)
2. Through that catalog, select the virtual table you want
3. Edit
4. Click on Edit Row using form
5. Wait for it to load
6. Create or Refresh Entity – Yes
7. Set the Primary key (make sure it's GUID)
8. Set the Primary Field
9. Save the form
10. It will be given the name Custom Entity and have DBO in the schema name by default.
11. The rest of the functionality is the same

Tables > Entity Catalog for [redacted] SQL

Table properties

Name	Primary column	Description
Entity Catalog for [redacted] SQL	Virtual Entity Name	Generated Entity Catalog
Type	Last modified	
Virtual	9 months ago	

Entity Catalog for [redacted] SQL columns and data

Virtual Entity Name
[redacted]
[redacted]
[redacted]
[redacted]
[redacted]
[redacted]
[redacted]
[redacted]

[dbo].[redacted] - Unsaved
Entity Catalog for [redacted] SQL

General Related

Virtual Entity Name [redacted]

Create or Refresh Entity Yes

Primary key of the Virtual Entity TransactionID

Primary field of the Virtual Entity --Select--



Create a virtual table



Create a virtual table

New table from external data

- ☒ Connection
- ☐ Data
- ☐ Review and finish

+ New connection ↻ Refresh

Want another data source? Currently we support SharePoint and SQL Server. However, there is a worka

Select a connection

Choose a connection to create a new table from external data.



SharePoint



SQL Server



Microsoft Fabric

Advanced options ▾

Governance and Column level security

Virtual tables are organizational level tables.
It will display whatever your account authorized to it has access to.

- ✓ Security at the source, and through security roles on Dataverse.
- ✗ No Field Level, or Column level security is possible/supported currently.

✓ Custom lookup fields with polymorphic lookups

It is possible to create custom security through polymorphic lookups and plugins.
Check out this article by Dynamics Ninja that explains how:
[Virtual Tables - Custom Ownership - Dynamics Ninja](#)

Quick tip for the Security role in Dataverse;
Make sure to add rights to the Connection table.

Edit column

Previously called fields. [Learn more](#)

✗ Field level security is not supported for virtual entity.



Different Native Data sources

Excel





Let's start with the elephant in the room - Excel

Why is it such a bad idea?

- Data **needs** to be in tables
- Macros **not** supported
- Formulas **not** supported
- Excel is currently **not** supported in the table driven Virtual Table experience
- Excel files **must be stored on a OneDrive** to participate in a Virtual Table connection
- **The workbook cannot be in use** when using it for Power Apps or Power Automate

Different Native Data sources

SharePoint



Limitations

- You currently can't select an All view for SharePoint columns on a virtual table. This is a known issue. (It is known)
- The following column types can't be included in a virtual table at this time:
 - Person
 - Image
 - Managed metadata
 - Location: coordinates
 - Attachment
- SharePoint specific columns that will be shown in the virtual table:
 - Compliance Asset ID is an internal column from SharePoint for tracking purposes. It can be ignored.
 - ID is the external primary key from SharePoint. It's read-only and can be ignored.

- Choice fields supported for SharePoint!
- Attachments can be uploaded to the virtual table connection



Different Native Data sources

SQL



Connecting to SQL

Pro tip!
toggle/checkbox/Boolean
Convert your SQL column to BIT
BIT is an integer with 0 and 1

The screenshot shows the Microsoft Power Apps 'Tables' interface. The sidebar on the left contains navigation options: Home, Create, Learn, Apps, Tables (selected), Connections, Flows, Solutions, and More. The main area displays a list of tables with columns: Table, Name, Type, Managed, Customizable, and Tags. The 'Recommended' tab is selected, showing a list of tables including Account, Address, Appointment, Attachment, Business Unit, Choices, Contact, Currency, Custom Entity, Email, and Email Template.

Table	Name	Type	Managed	Customizable	Tags
Account		Standard	Yes	Yes	Core
Address		Standard	Yes	Yes	Standard
Appointment		Activity	Yes	Yes	Productivity
Attachment		Standard	Yes	Yes	Productivity
Business Unit		Standard	Yes	Yes	Standard
Choices		Standard	No	Yes	Custom
Contact		Standard	Yes	Yes	Core
Currency		Standard	Yes	Yes	Standard
Custom Entity		Virtual	No	Yes	Custom
Custom Entity		Virtual	No	Yes	Custom
Custom Entity		Virtual	No	Yes	Custom
Email		Activity	Yes	Yes	Productivity
Email Template		Standard	Yes	Yes	Standard

Virtual stored procedure

Through the Dataverse Accelerator App

Dataverse uses the plugin capability to call stored procedures.

- You can specify how you want to fill it through the wizard.
- Input what is needed, in the plugin it will allow you to say:
 - field a is input 1
 - field b is input 2
- Make it execute on a button as an onclick event
- Run and push it the output only to a SQL table
- Access a Virtual Table to access the SQL Table

No delegation issues

That is an issue through when you try through Power Automate.
Also, it's much faster and much more responsive.

Output stays in SQL right now but this could be valuable to your client process.





**Azure Synapse
Analytics**

Different Data sources

Azure Data lake to serverless SQL



Connecting to Azure Synapse and SQL

1

Get a data lake

2

Create a
Serverless SQL
Pool

3

Connect to
External Tables,
to the Parquet
files

4

Connect to
Virtual Tables



Virtual tables with AAD table?

AAD User (Azure Active Directory/Entra ID) is different from the **User table** in Dataverse.

No manager lookups, possible future feature

No groups, only users can be looked up

Dataverse User table

Only displays users with a Dataverse license.

AAD User table

Will show anyone in the AAD User address book.



Virtual table that connects to ALL users as **read-only**.

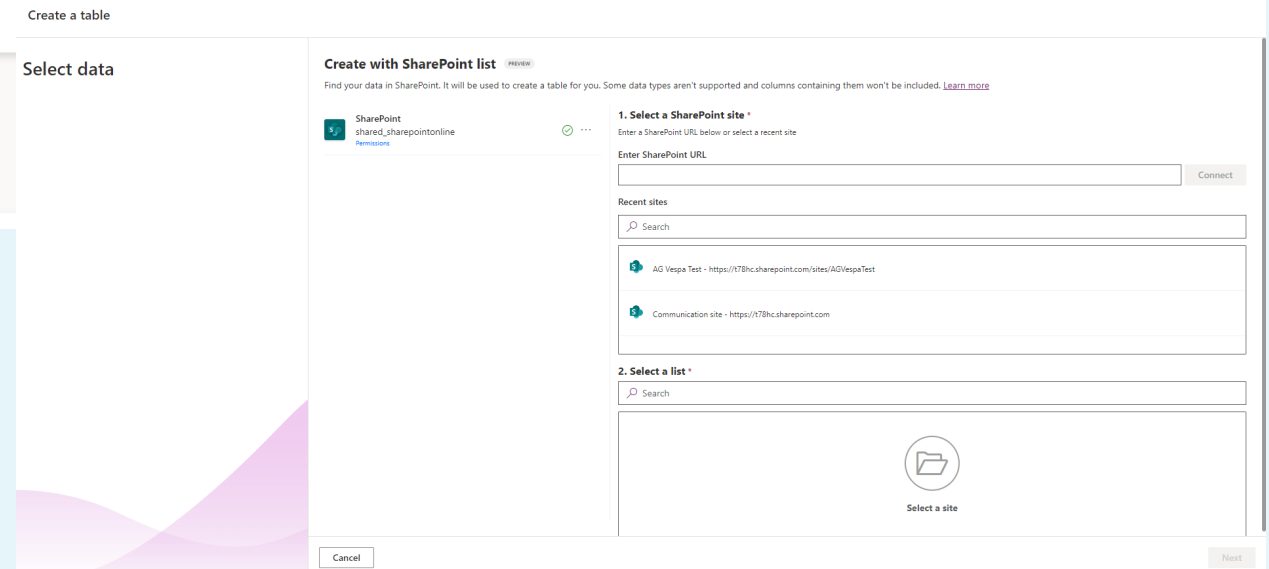
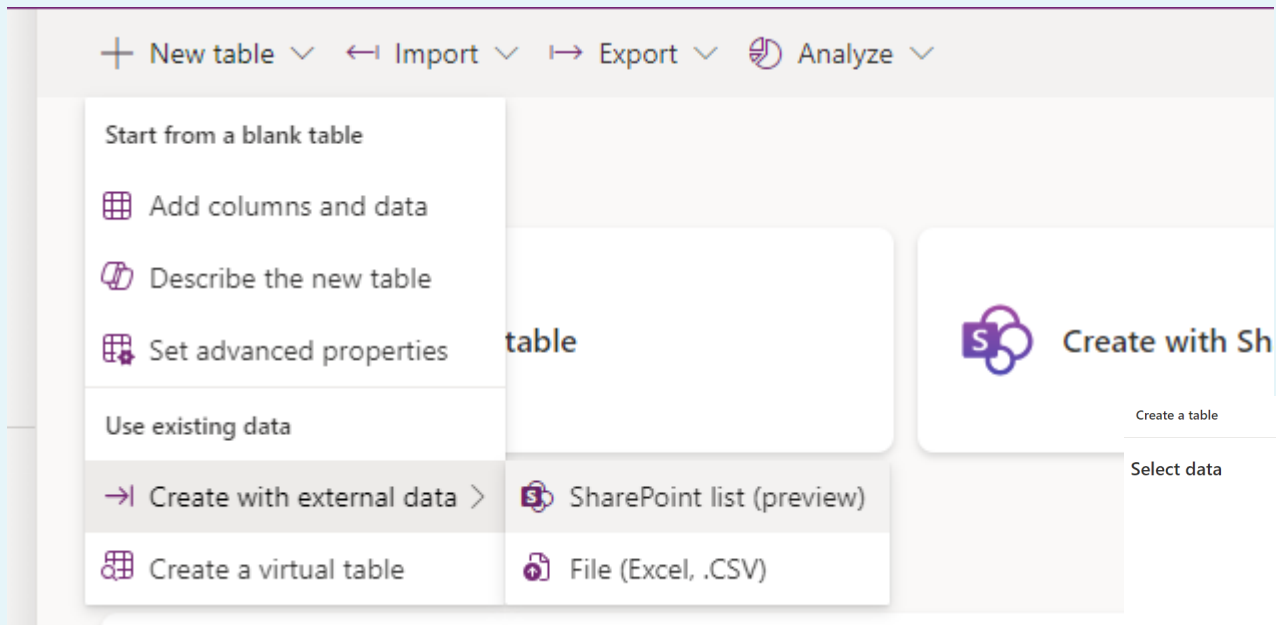


This table is NOT available through Power Automate. (It leverages Graph)



Include the AAD User table in multi-table lookups (polymorphic lookups)

Create with external data - SharePoint list preview



Create with external data - SharePoint list preview

Create a table

Select data

Create with SharePoint list PREVIEW

Find your data in SharePoint. It will be used to create a table for you. Some data types aren't supported and columns containing them won't be included. [Learn more](#)



SharePoint
shared_sharepointonline
[Permissions](#)



1. Select a SharePoint site *

Enter a SharePoint URL below or select a recent site

Enter SharePoint URL

Connect

Recent sites



AG Vespa Test - <https://t78hc.sharepoint.com/sites/AGVespaTest>



Communication site - <https://t78hc.sharepoint.com>

2. Select a list *



Select a site

Cancel

Next

Leveraging the Power Platform





Model Driven Apps

Power Pages



Works with Dataverse



Any other data source needs to be connected through a virtual table.





- ☒ Works with all data connectors!
- ☐ Save data locally in the table.
- ☐ Patch to the virtual table with custom fields.
- ☒ Display data through lookup fields.

Canvas Apps





Power Automate



Dataverse trigger - 'When a row is added, modified or deleted' doesn't work with Virtual Tables.



Use a trigger on your data source!

For example, when a SQL item has been modified.



Dataverse trigger - 'When a row is added, modified or deleted' is supported for Virtual Tables with Dataverse Events (More on that later)

Copilot Studio



You can call information from Dataverse, both normal and virtual tables.



Connect using Power Automate in an action to create new rows, update rows, list rows etc. for a Virtual Table.

New table from external data

● Connection

○ Data

○ Review and finish


+ New connection


↻ Refresh


ⓘ Want another data source? Help us improve the experience by sharing your feedback [here](#).

Select a connection


Choose a connection to create a new table from external data.

 SharePoint


TenantAdmin@t78hc.onmicrosoft.c... 

 SQL Server

+ [Add Connection](#)

 Microsoft Fabric

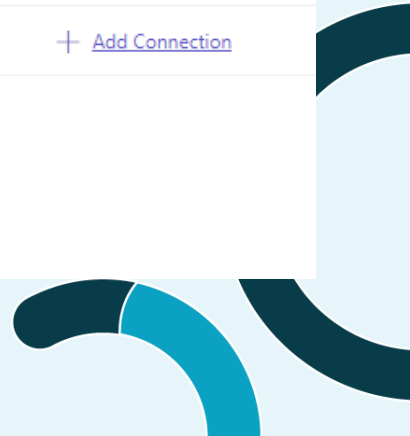
+ [Add Connection](#)

 Salesforce

+ [Add Connection](#)

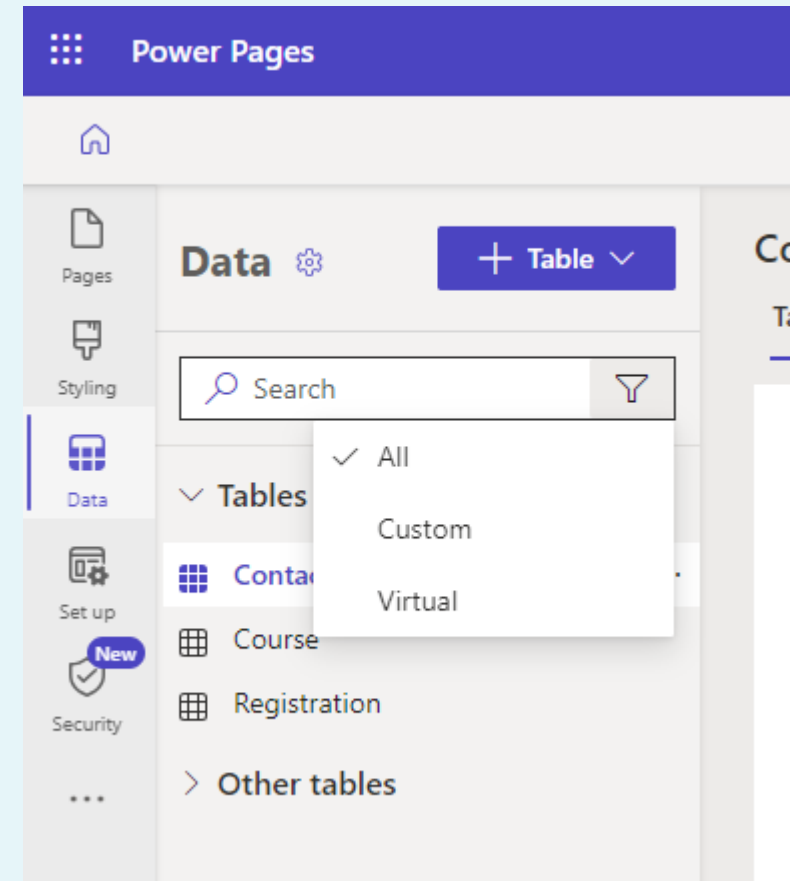
Advanced options

▼



Power Pages

- **Create** a Virtual Table straight from Power Pages with SQL and Sharepoint (lists)! - connect to an external table data option.
- **Filter** on virtual or regular on the add table interface
- The **icon** has also changed to differentiate between the types of tables, Virtual vs Dataverse



ALM for Virtual Tables



MAKE USE OF
ENVIRONMENT VARIABLES
UPON CREATION



PROVIDE BETTER **PIPELINE**
DISTRIBUTION



NO MORE MANUAL WORK
AFTERWARDS!

SQL AND SHAREPOINT
VIRTUAL TABLES CAN USE
ENVIRONMENT VARIABLES



EXPORT
IN THE SOLUTION MAKER
YOU CAN SELECT/CREATE A
TARGET SOURCE



IMPORT
USERS CAN SELECT/PROVIDE
THE TARGET SOURCE



TO BE ADDED **DIRECTLY IN**
THE ALM PIPELINE.

ALM for Virtual Tables

New table from external data

● Connection

○ Data

○ Review and finish

+ New connection





↻ Refresh

ⓘ Want another data source?

Currently we support SharePoint and SQL Server. However, there is a workaround for other data sources. [Details here.](#)

Select a connection

Choose a connection to create a new table from external data.

	SharePoint	nhelgren@microsoft.com	✓
	SQL Server	SynapseLinkforDV@Dynamics365SA...	✓
	SQL Server	nhelgren@microsoft.com	✓
	SQL Server	adventureworks-lightweight-db con...	✓

Advanced options ^

☐ Manually configure connection reference

☐ Use Environment Variables

ALM for Virtual Tables

Power Apps Search

+ New solution ← Import solution Open AppSource Publish all customizations

Solutions

Unmanaged Managed All

Display name ▾		Name ▾
Common Data Services Default Solution	⋮	Crba87c
Default Solution	⋮	Default

Import a solution

Environment
joratztest

Environment Variables

Enter information for each field, so your app works properly. You can edit your environment variables later.

2 updates needed

Database

Server

Import Cancel

Reporting



Virtual Table - Reporting



Only available in PowerBI through the Common Data Service (Legacy) connector



Don't use the Dataverse connector.
It won't display the virtual tables.



You can also connect directly to the source as well.



[Power Query Common Data Service \(Legacy\) connector](#)

Get Data

common



All



Common Data Service (Legacy)

All

Power Platform

Navigator

Display Options

https://[redacted]crm.dynamics.com/ [2]

Entities [303]

- ☐ aaduser
- ☐ Account
- ☐ activityfileattachment
- ☐ ActivityMimeTypeAttachment
- ☐ ActivityParty
- ☐ ActivityPointer
- ☐ Annotation
- ☐ appaction
- ☐ appaction_appactionrule_classicrules

Known Limitations
on all virtual tables
+ possible workarounds



Positive points

- View data from multiple tables as a single table
- Perform complex queries
- View of data that is customized for a specific user or group
- Access data from external sources
- No need to migrate data
- Cost saving – no double data storage needed like with Dataflows
- Easy setup, no custom coding needed
- You're able to leverage them throughout the entire Power Platform
- Supported by Dataverse for Teams



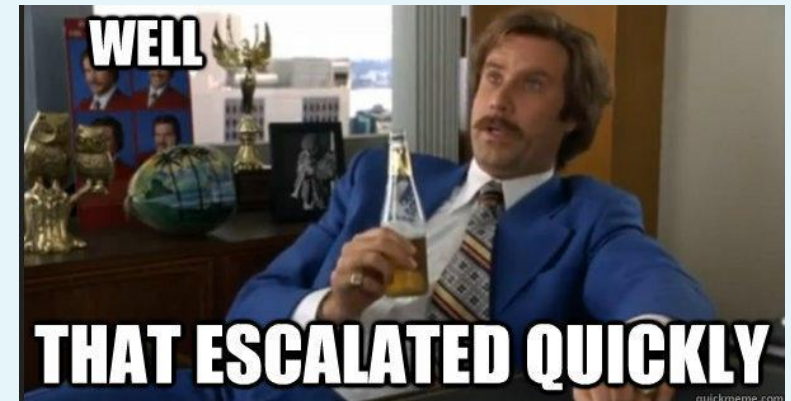


Limitations

1. No dropdown/choice columns on SQL data backend
2. No Field Level Security possible (Security at the source)
3. Business Process Flows are not supported
4. Files and attachments are not supported
5. Virtual table queries are limited to return 1000 records per query
6. Max character length for text is 4000 characters
7. No activity type tables (feedback)

Limitations

- Rollup and calculation fields not supported
- Audit logs - No Dataverse auditing possible on a virtual table
- Values inside Primary Column need to be GUID (non string)
- The primary key needs to be correct or the data (SQL or Excel) wont display
- Cannot set view on primary key column – descending
- Dataverse can only create columns that include datatypes that are compatible
- Existing tables cannot be converted
- Virtual tables don't allow joined connections
- SharePoint will use the hidden numeric ID field present in all lists





Trick your virtual entity connection into allowing dropdowns, or other unsupported ISV/data actions.

For example: A dropdown/choice doesn't exist into SQL. Make it look like one, but have the data be outputted as text.

What is a PCF component?

It's a piece of code, wrapped around your control, to make it behave differently, but still have the same result for your data source.

You can re-use these components throughout your solution.

- After importing your component
- Double click on your control in your form
- Add to your form control (if desired, hide the default controls)

CSV Dropdown Control | PCF Gallery

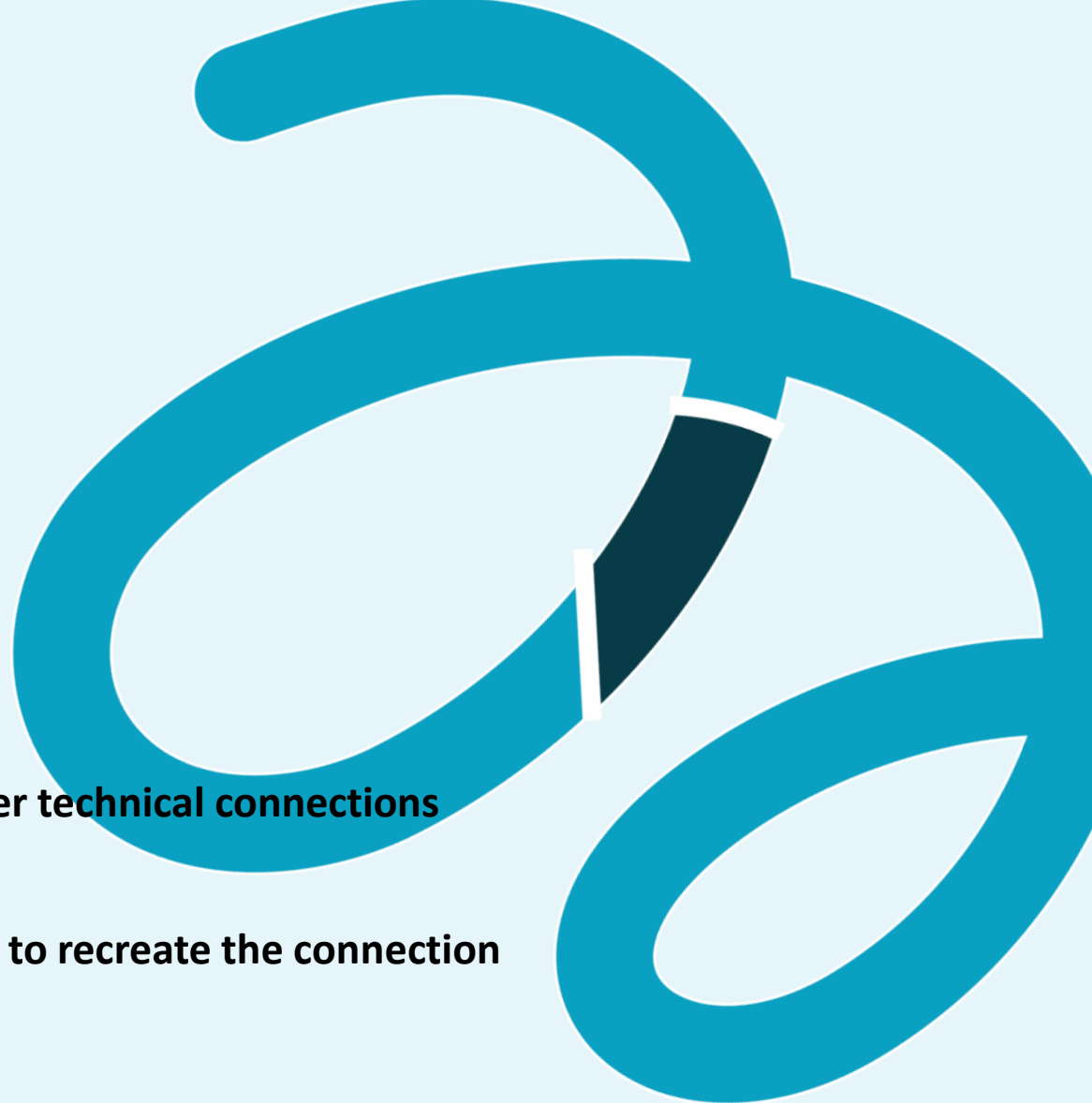


Pro tip – Make sure you also import your PCF component in your destination environment if you do ALM



Recap + final notes

- Works best in cases to read information
- Natively Excel, SharePoint, SQL and added Salesforce and Fabric
- You can use them throughout the Power Platform
- New Dataverse filtering with icons for regular and virtual tables
- ALM variables added
- Reporting possible with Virtual Tables
- Any other data connectors require OData queries or other deeper technical connections
- Not every column is compatible depending on your data source
- They can break easily, no way to update virtual tables. You need to recreate the connection
- No auditing on the virtual table
- Full CRUD mostly works
- You can only query per 1000 items. Multi stacking is possible, but not recommended



That's it-
Questions?





**PLEASE “HEART”
THIS SESSION
IN THE APP AND
GIVE YOUR
FEEDBACK**

WE VALUE YOUR OPINION!



THANK YOU!

2024

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